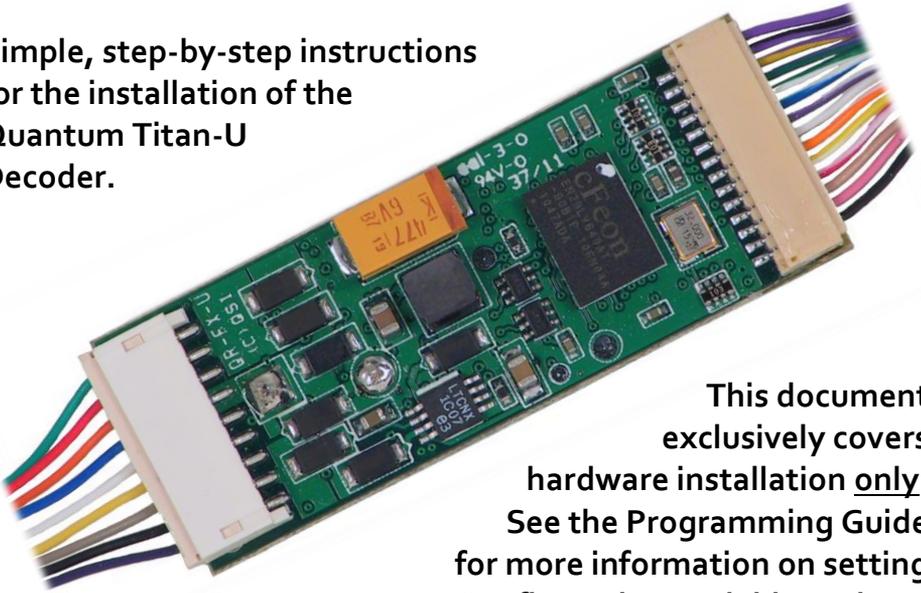


QSI Solutions

Titan-U

Installation Guide

Simple, step-by-step instructions
for the installation of the
Quantum Titan-U
Decoder.



This document
exclusively covers
hardware installation only.
See the Programming Guide
for more information on setting
your Configuration Variable options.

!STOP!

**Read this entire document!
Failure to follow these
instructions could disqualify
you for warranty service!**

"U.S. Patent Numbers: 4,914,431. 5,448,142.
US Reissue Patent Number RE38,660"
Configuration Patent Pending

Table of Contents

Preparing For Your Installation.....	Pg. 2
“Plug and Play” Installations.....	Pg. 3
Installation Overview.....	Pg. 4
How To Use This Install Guide.....	Pg. 5
<u>Installation In detail</u>	
Step 1: Mounting the Decoder.....	Pg. 6
Step 2: Pickup Connections.....	Pg. 6
Step 3: Motor Connection.....	Pg. 7
Step 4: Lighting Connections.....	Pg. 8
Step 4: Headlight/Reverse Light Connections.....	Pg. 9
Step 5: Auxiliary Light Connections.....	Pg. 10
Step 6: Speaker Mounting.....	Pg. 11
Step 7: Speaker Wiring.....	Pg. 11
Step8: Chuff Cam Connection (Steam Only, Optional).....	Pg. 12
Step 9: Reed Switch Connection (Optional).....	Pg. 12
Step 10: “Smart Cap” Connection.....	Pg. 13
Decoder Features and Ratings.....	Pg. 14

In addition to this Install Guide you should have also received one of the following:

Q2Fx Software Programming Guide

Q3 Software Programming Guide

Preparing for your Installation

2.

1: We know you're anxious to get your engine running — but PLEASE go through this install manual completely before trying to do so. The methods described here are time-tested — and proven — and we strongly recommend strict adherence to them. Most importantly, if you follow these methods, you will not only have an easier time installing your decoder, but WE at QSI Solutions will have an easier time providing any tech support if we know exactly how you have your decoder connected.

2. Observe Electrostatic Discharge (ESD) Precautions! Ground yourself to “house ground” at your bench to discharge any static build-up *before* handling the decoder. Failure to do so may render the decoder non-functional. Note that ESD failures are *not* covered by the warranty!

3. Ensure your test area is clean, well lit, and free of metal debris.

4. Do not install or connect your decoder to a tester if the power is on.
Familiarize yourself with the decoder DC/DCC Inputs, motor outputs and lighting Ports.
Connecting these incorrectly will almost certainly create a “smoke out!”

5. Test the decoder before installing. **DO NOT ATTEMPT TO PROGRAM NOW!** We HIGHLY recommend using a circuit breaker on your test track. This will help protect your investment in all of your decoders. We use the DCC Specialties PSX series, as they are the most robust, flexible units on the market.

6. Use a decoder tester if you have one; if not, you can use alligator clips to make the necessary connections. This should be done with care to avoid inadvertent contact between the clips — which may short the decoder. Use tape to keep the wires/connections from moving.

7. Due to the Titan's robust power capacity, using a light bulb to simulate motor performance is not recommended. Instead, use an actual motor to test the decoder. The motor doesn't have to be anything special; an inexpensive hobby store motor should work just fine. Make sure your test speaker(s) are 8 or 16Ω [ohm]. After you are sure all connections are correct, and will not short, connect your test set up to a (10v-24v), DC or DCC Power Unit.

8. In **DC** you will need to increase the throttle to about 7v to fire up the sounds, etc.
In **DCC**, select address 3 (the factory default), advance the throttle, and the decoder should function.

MAKE SURE TO TEST THE DECODER ON ADDRESS 3 BEFORE YOU CHANGE ITS ADDRESS!

After you've verified the decoder is operating properly, you are ready to proceed with your installation.

If you get into trouble, you can reset the decoder to default by entering the following CVs in the order shown below.

1: CV 49 = 128

2: CV 50 = 255

3: CV 56 = 113

The decoder will speak the word “RESET” when the last CV is entered (if done on the mainline) OR when power is next applied (if done on the program track.)*

***SOME DCC SYSTEMS MAY REQUIRE YOU TO CYCLE THE POWER TO THE LOCOMOTIVE AFTER PROGRAMMING THE LAST CV.**

“Plug and Play” Installations

3.

The Titan U decoder is equipped with two different NMRA standardized “Plug and Play” connectors. The 8 pin “NMRA” plug is the interconnect at the end of the primary P1 wire harness which terminates in a male 9 pin “JST” header or “Quick-Plug”. These two connectors are the most commonly used by model manufacturers in N-O scale. Even though locomotives come advertised as “DCC Ready” they are usually not *sound* ready. This means that even though the loco has a seemingly convenient NMRA socket or JST Quick Plug, you may not have the headroom required to plug in a sound decoder as they are typically bulkier than traditional motor only decoders. It is possible that you will need to remove weight using a Dremel tool, band saw, or milling machine. If you *do* have room to simply plug in the decoder there are *still* some things to be aware of to avoid the risk of potentially damaging either the decoder or the locomotive itself:

8 Pin NMRA Connections:

- The 8 pin sockets built into many “DCC Ready” models are almost always equipped with a shorting plug from the factory. This plug connects the motor and the pickup wires so that the locomotive will run on Analog DC straight out of the box. Make sure to remove this plug before attempting to connect your decoder.
- Be sure to check the underside of the board that the 8 pin socket mounts through. Sometimes model manufacturers do not check the solder connections on the underside of the board and you will have either solder bridges between the pins themselves, or worse, the base of the pins will be hard shorted against the motor case.
- Once you have determined that your 8 Pin socket has no solder bridges and will not short against the motor casing, simply plug in the 8 Pin male plug at the end of the P1 wiring harness on the Titan. If your loco runs in the incorrect direction after connection, simply remove the loco from the track, remove the 8 Pin plug, rotate it 180°, and reconnect it.

9 Pin JST or “Quick Plug” Connections:

- A lot of model manufacturers (most notably Athearn) have moved to the JST or Quick Plug type of interconnect. This is a flat, plastic, male connector with all the pins in a single row instead of stacked like they are on the 8 Pin NMRA Plug. This is advantageous because it allows for easy connection of a total of 4 light functions without the need for additional wiring. JST connectors also come factory equipped with shorting plugs which must be removed prior to decoder connection. When using a JST connector, you will unplug the whole P1 wiring harness from the Titan U and connect the male JST connector in the loco directly to the female P1 JST socket on the Titan U.

Speaker Connections:

The only necessary items required with a Plug and Play installation are the speaker connections. These are covered in detail on page 11.

»VERY IMPORTANT NOTE«

MANY LOCOS THAT ARE EQUIPPED WITH A 9 PIN JST QUICK PLUG ARE ALSO EQUIPPED WITH AN ADDITIONAL 8 PIN NMRA SOCKET, GIVING YOU A CHOICE OF WHICH CONNECTOR TO USE. IT IS IMPERATIVE THAT YOU MAKE SURE THAT NEITHER CONNECTOR HAVE A SHORTING PLUG IN PLACE WHEN YOU CONNECT THE DECODER. A SHORTING PLUG LEFT IN PLACE WILL DESTROY THE DECODER AT POWERUP AND WILL DISQUALIFY YOU FOR WARRANTY ELIGIBILITY. PLEASE INSPECT YOUR LOCO THOROUGHLY!

Installation Overview

4.

This is an *overview* of the general steps you'll be taking to install your Titan-U decoder. If you have questions or doubts about your ability to perform any of these tasks, please contact us or a Certified QSI Solutions Certified Installer in your area for assistance.

Remember that this is a GENERAL overview. Each of these steps is explained in detail later in this manual. DO NOT BEGIN YET!

Since the Titan-U, is a universal decoder it will sometimes be installed in locos which were not designed for sound. As a result, you often have to remove weight or modify the frame in order for the decoder and speakers to fit. We recommend that you perform the following — in this order..

1. Remove the loco shell.
2. Familiarize yourself with the locations of all pickup, motor, and light wires.
3. Inspect existing factory wiring for defects.
 - Pickup wires should flex easily with truck motion. Any clips used for holding the wire to a factory installed light board should be removed and discarded.
 - Motor wires should be long enough to span twice the width of the motor.
 - Factory installed lights should be tested before connecting to the Titan A Decoder. To test small bulbs start with a 1.5v battery (AA). For LEDs use a 9v battery with a 1000Ω resistor on the – (negative) lead. Remember LEDs are polarity-specific.
4. Remove weight as necessary to make space for your speakers and decoder.
5. Replace any wires necessary to meet the criteria outlined in step 3.
6. Mount the decoder.
7. Connect the pickup wires.
8. Connect the motor wires.
 - Test run for correct motor direction.
9. Connect the lighting wires.
 - Test run for light functionality.
10. Mount your speakers.
11. Connect the speaker wires.
 - Test run for speaker functionality.
12. Replace the loco shell.

Tools You'll Need

In addition to the Titan-U Decoder and speakers you'll need a few more tools to complete the installation.

- 15-25w soldering iron
- Solder flux
- Rosin Core Solder
- Small gauge wire stripper
- Small wire cutters
- Non-conductive tape. We recommend Kapton tape over standard electrical tape. It is much more heat resistant and will not leave a sticky residue like electrical tape.
- Circuit Breaker Protected DC or DCC Test Track
- Tweezers

Additional (but optional) Tools

- Double stick foam mounting tape
- Dremel tool or similar motor tool
- Multimeter with continuity tester
- Heat shrink tubing

How to Use This Install Guide

5.

The installation methods and techniques outlined in this manual were developed by our group of DCC installers who have thousands of DCC sound installs to their credit. In order to simplify the installation process we use a series of color-coded hookup diagrams. Color codes will comply with NMRA standards where they exist and will match the wire color on the decoder itself for QSI-specific connections.

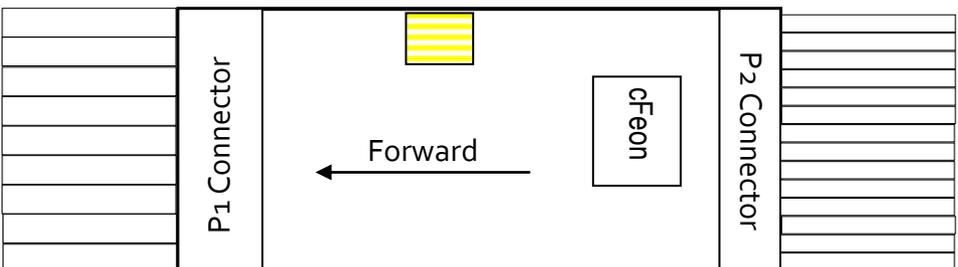
It is important to remember that most model manufacturers DO NOT comply with NMRA color standards, so caution is urged! Below is the color coded chart which will assist you in making the proper connections when hardwiring any of the connections on the decoder. Using this and the hook diagrams should be able to easily make sure that you are connecting your wires to the correct locations.

		P1 Connector	
P1	Function	Wire Color	Also Connects To
9	Port 3	Green	P1 6, Blue or P2 11, Red w/White
8	Right Rail	Red	Right Rail Power From Loco
7	Motor +	Orange	Motor +
6	+V	Blue	Lighting functions
5	Port 1	White	P1 6, Blue or P2 11, Red w/White
4	Port 2	Yellow	P1 6, Blue or P2 11, Red w/White
3	Motor -	Gray	Motor --
2	Left Rail	Black	Left Rail Power From Loco
1	Port 4	Purple	P1 6, Blue or P2 11, Red w/White
		P2 Connector	
P2	Function	Wire Color	Also Connects To
1	SPKR 1+	Violet w/ Red	Speaker 1 +
2	SPKR 1-	Violet w/ Black	Speaker 1 --
3	SPKR 2+	Violet w/ Yellow	Speaker 2 +
4	SPKR 2-	Violet w/ Green	Speaker 2 --
5	Port 5	White w/Green	P1 6, Blue or P2 11, Red w/White
6	Port 6	White w/Blue	P1 6, Blue or P2 11, Red w/White
7	Port 7	White w/ Violet	P1 6, Blue or P2 11, Red w/White
8	Port 8	White w/ Grey	P1 6, Blue or P2 11, Red w/White
9	Port 9	Orange w/ White	P1 6, Blue or P2 11, Red w/White
10	Port 10	Yellow w/ White	P1 6, Blue or P2 11, Red w/White
11	5v+	Red w/ White	5 volt common
12	Chuff	Tan	For cam sync steam chuff
13	Reed	Pink	to Ground for Hard reset
14	Ground	Black w/ White	

Below
blank

is a

hookup diagram. Notice that only the board outline, and a few components on the top of the decoder are shown. This is just for orientation purposes. Every hookup diagram in this manual will be oriented in this manner. We recommend you orient your loco and decoder in the same manner for apples-to-apples reference.



Step 1: Mounting the decoder

The Titan-U decoder is not equipped with mounting hardware meaning that the decoder can “float” inside your engine somewhat if not secured. The decoder is enclosed in non-conductive heat shrink to prevent most short circuits but care should still be taken to make sure the decoder can’t move too much. Double sided foam tape is the quickest, easiest solution.

Step 2: Pickup Connections

A good pickup system is the most important element in any DCC installation. Careful attention to detail in this step will ensure hours of trouble free operation. Diesel locomotives should have a pickup wire from both rails on BOTH trucks. Steam engines should have pickup wires coming from both rails in both the drive section and tender. If your loco does not meet these criteria you should either add appropriate pickup, or a Keep Alive unit like the Lenz Power1, ESU Powerpack, or TCS KA series. Failure to do so will impact operation and prevent software upgrades from completing successfully.

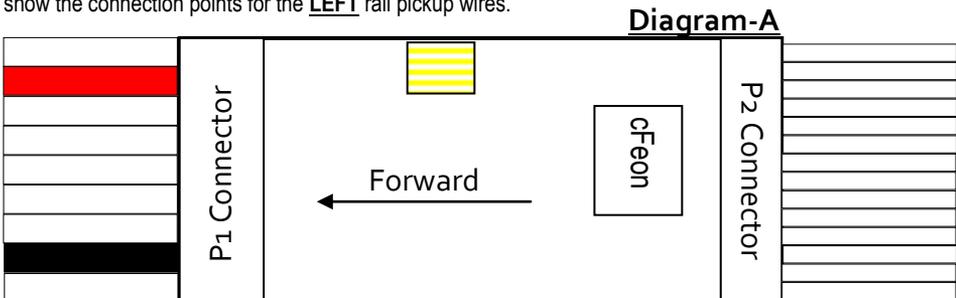
The most important part of connecting your pickups is to not “cross-wire” them. Doing so WILL create a short circuit and WILL damage the decoder! **MAKE SURE** you have observed proper polarity when connecting the pickup wires to the decoder.

Double check the wires where they attach to the trucks in order to ensure that the connection is adequate. If there is any evidence of frayed or stressed wires, remove and replace them before proceeding!

Once you’re confident your pickup wires have clean connections to the trucks, you can run your wires to the pickup wires on the decoder. **DO NOT SOLDER THEM YET.** Trim the pickup wires to length making sure to leave enough additional wire to allow the trucks to pivot correctly after the wires have been connected.

Strip about 0.25” from the end of the pickup wires and tin* them. Add a drop of flux to the pickup wire connections on the decoder, and tin these as well.

After your wires are tinned, connect the pickup wires to the wires on the decoder. The **RED** bar in Diagram-A show the connection points for the **RIGHT** rail pickup wires. The **BLACK** bar in Diagram-A show the connection points for the **LEFT** rail pickup wires.



Now, use your multimeter in continuity testing mode to verify solid connection between the wheels and the decoder. At this point, some modelers will place the loco on a test track and apply power — to verify that the circuit breaker is not being tripped. If you take this additional step, and your circuit breaker shuts down track power, you have very likely cross-wired your pickups! Better to know now, than... !

*Tinning is a process by which you pre-coat with solder the areas you’re going to solder together. To tin wires, apply a drop of flux to the stripped end; melt a bead of solder on the tip of your iron, and drag it the length of the stripped section. To tin solder pads, put a drop of flux on the pad, melt a bead of solder on the tip of your iron, and touch it to the pad. When it’s time to connect tinned wires and pads, simply hold them together, and quickly touch them with your soldering iron. The solder should flow between the two points, creating a clean and shiny-bright solder connection. (BEWARE dull-looking joints! Called “cold joints,” they are often non-conductive!)

Step 3: Motor Connection

IMPORTANT! Now that your pickup wires are connected, it is possible to power up the decoder. **IT IS IMPERATIVE THAT NO CONNECTIONS ARE SOLDERED ON THE DECODER WHILE IT IS POWERED UP!**

Now that your decoder is mounted and pickups are connected, we need to wire the motor. This is also a key step in your installation, and it's very important that the motor outputs on the decoder are not shorted together (do not touch each other) at any time! Such a short circuit spells “devastation” to your decoder!

Verify that the motor in your model is properly “isolated.” In other words, make certain that the motor will be getting input ONLY from the decoder, and that there is NO direct connection between track pickup and the motor. Testing with your multimeter in continuity mode should show NO connection between the wheels and the motor brushes. All power to the motor must be supplied by the decoder. Any additional or incidental connection between the track/frame and the motor must be eliminated, as this will damage the decoder. *Note that failure to properly isolate the motor will disqualify you for warranty service.*

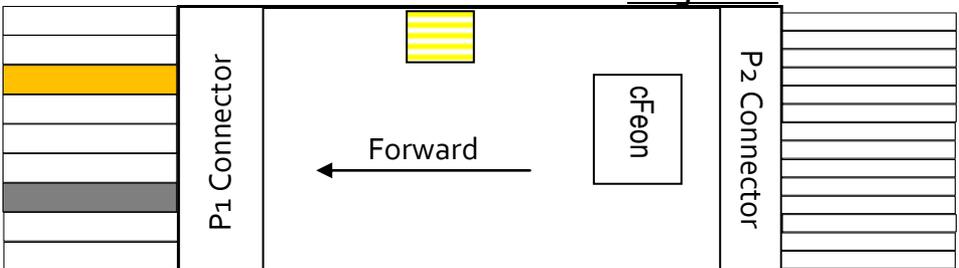
Verify that your factory installed motor wiring is suitable for connection to the decoder. If wires are frayed or stressed replace them now. Some models will come with phosphor bronze strips which transfer power from the factory installed lighting board to the motor, in this case trim the strips back and solder wires to them. Make sure to insulate around any bare motor wires/strips to make sure they don't short out against each other, the motor case, frame, or any of the components on the underside of the decoder!

We recommend temporarily connecting your motor wires and running a quick direction test prior to final trimming for length. You want to make sure that when your DCC system displays FWD on the screen, that the loco is actually moving forward.* If your loco runs in the opposite direction simply unhook your wires and swap their location on the decoder. Once you've verified proper direction you can trim your wires for length and reconnect to the motor.

You can trim motor wires fairly short as they do not need to move like pickup wires do but we still recommend leaving at minimum 0.75” extra wire. Strip about 0.25” from the end of the motor wires and tin them. Add a drop of flux to the motor wires on the decoder and tin these as well.

After your solder pads and wires are tinned; solder the motor wires to the decoder. The **ORANGE** bar in Diagram-B shows the connection point for the **POSITIVE (+)** motor wire. The **GREY** bar in Diagram-B shows the connection point for the **NEGATIVE (-)** motor wire.

Diagram-B



*Some installers, who plan to run diesel locomotives in consist, will intentionally wire the motor leads backwards — so they can skip a step in setting their consists up. This works in theory — but creates a number of problems going forward. To work correctly, several QSI features actually rely on the decoder being wired in the correct direction. Changing the direction of travel by physically wiring the decoder backwards will result in headlights that go bright in reverse, and vice versa. It takes *substantially* more time to reprogram these settings than it does to simply swap the wires on the decoder.

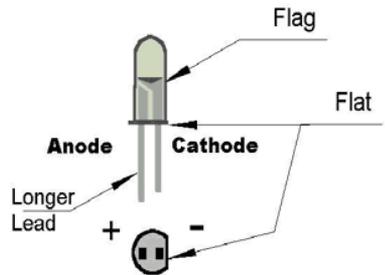
Step 4: Lighting Connections

8.

Now that we have a rolling chassis, it's time to start hooking up the fun stuff. Many railroaders find lighting to be the most difficult part of any installation — but the design of the Titan-U, combined with QSI's Automatic Lighting Software, makes basic installation a snap. Let's go through a quick overview of our lighting setup — and then get into actual connections.

Things and terms you should know:

- QSI Solutions refers to hardware light function outputs as "Ports." This decoder has 10 Ports.
- The Titan-U decoder requires resistors for all lighting connections.
- The primary Common power supply on the decoder is 5v. There is also a secondary common output which supplies rectified track voltage. These two commons are interchangeable but require different resistor values depending on which one you choose to use.
- All Ports come pre-programmed, with a specific lighting effect already assigned to them. Wiring to pre-programmed ports saves a lot of programming time down the road.
- QSI's automatic lighting control will automatically change lights (on/off, dim/bright etc.) based on prototypical practices. Users have the ability to assign discreet function button control if they like. Please see the *QSI Solutions Programming Guide* for further information.
- QSI uses Pulse Width Modulation [PWM] for control of light intensity. All lights have 256 programmable intensity levels.
- Due to QSI's use of PWM light control, use of a conventional Multimeter to measure light port output is not possible. Only a highly sensitive RMS meter can read the power output properly.
- Default intensity settings are set using LEDs. Use of 1.5v bulbs may require CV adjustment for proper dim → bright behavior.
- LEDs are polarity sensitive. The diagram to the right shows a cross section of a traditional LED.
- Use of LEDs requires wiring the Cathode (or -, or Flag) to the Function (or Port) wire on the decoder. ***Note Red LEDs typically are polarity reversed.**
- Similarly, you will always wire the Anode (or +) to the common on the decoder.
- This manual assumes that you are using the primary 5v common for all lighting circuits.
- If using the primary 5v common, resistor values should be:
 - 110Ω ¼ watt for LEDs
 - 110Ω ¼ watt for 1.5v bulbs.
- If using the secondary 12v common, resistor values should be:
 - 1000Ω ¼ watt for LEDs.
 - 750Ω ¼ watt 1.5v bulbs.
- If using multiple bulbs on one Port we recommend parallel wiring and a resistor for EACH device connected.
- What is considered "correct brightness" is a relative matter. Resistor values can vary depending on user preference. The rule of thumb is to program a little on the low side. Remember that while you can always turn the brightness down, the "Bright" state of the decoder comes programmed at maximum output — which means you CAN'T turn it UP!

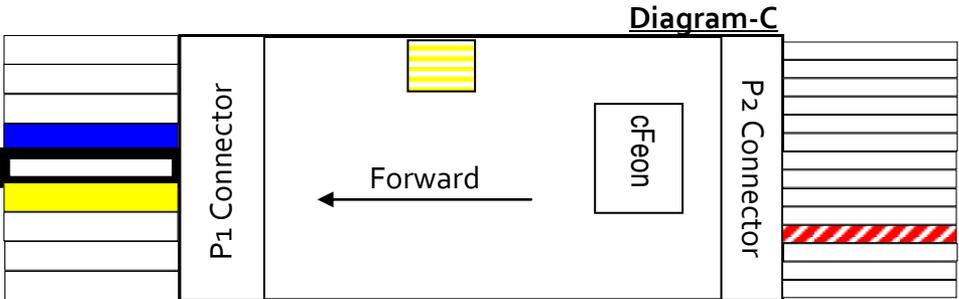


Step 4: Headlight/Reverse Light Connections

9.

The most basic lighting almost every loco will have installed are the Forward and Reverse lights.

After the light wires and decoder wires and wires are both stripped and tinned, solder the headlight wires to the decoder wires. The emphasized **WHITE** bar in Diagram-C shows the connection point for the Cathode (- or flag) of your LED. The **RED/WHITE** bar in Diagram-C shows the connection point for the Anode (+) of your LED. If you're using a 1.5v bulb, you simply connect either wire to these two points. **Note: Since nearly all lighting connections require connection to one of the 5v common tabs you may want to save this connection for last so that you can group all common wires together for a single connection.*



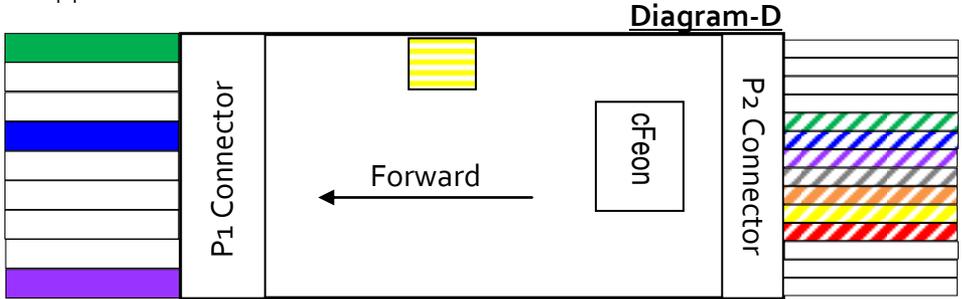
Now solder the Reverse Light wires to the decoder. The **YELLOW** bar in Diagram-C shows the connection point for the Cathode (- or flag) of your LED. The **RED/WHITE** bar in Diagram-C shows the connection point for the Anode (+) of your LED. If you're using a 1.5v bulb you simply connect either wire to these two points. You can now test run the loco for light functionality. If using LEDs, you should see the lights go from Dim in Neutral to Bright in FWD. If using 1.5v bulbs you will probably see the bulb go to full brightness only when you start to move.

Don't panic! This is simply an indicator that your Headlight Minimum Intensity is set too low. Don't worry about it now. Finish the installation and we'll correct the headlight behavior afterwards. Information on programming this, or any other feature, mentioned in this Install Guide can be found in the respective Programming Guide for the software in your Titan decoder, as well as in the Complete DCC Reference Manual located online at www.QSISolutions.com

You'll notice that the **Blue** 12v common connection is also shown here, this is simply to remind you that you can use this wire if you choose, you will just need to use a higher value resistor to accommodate its increased output.

Step 5: Auxiliary Light Connections

Most of the remaining decoder wires connections are for auxiliary lights. Diagram-E shows all of the auxiliary light connections. Due to the sheer number of these Ports, we'll streamline this section a little using a table to show the color code, Port (F) number, and light effect assigned to that specific Port. Then we'll outline the hookup procedure.



Once you've determined which wires you'll need to connect to in order to get the desired light effects, tin the decoder wire for each port and the light wire(s) you intend to connect. The colored bars in Diagram-D show the connection point for the Cathode (- or flag) of your LED. The **RED/WHITE** dot in Diagram-D shows the connection point for the Anode (+) of your LED. If you're using a 1.5v bulb you can disregard polarity and simply connect either wire between these two points.

Port #	Color In Diagram	Default Light Effect Diesel	Default Light Effect Steam
Port 1	White	○ Head Light	Head Light
Port 2	Yellow	● Reverse Light	Reverse Light
Port 3	Green	● Front Left Ditch Light	Mars Light
Port 4	Purple	● Front Right Ditch Light	Number Board Lights
Port 5	White/Green Stripe	● Front Mars Light	Front Marker Lights
Port 6	White/Blue Stripe	● Front Number Board Light	Rear Marker Lights
Port 7	White/Purple Stripe	● Rear Number Board Light	Front Cab Light
Port 8	White/Grey Stripe	● Front Cab Lights	Rear Cab Light
Port 9	Orange/White Stripe	● Front Overhead Beacon	Firebox Flicker 1
Port 10	Yellow/White Stripe	● Front Marker Lights	Firebox Flicker 2
Add. Hookup	Color In Diagram	Purpose	
+12	Blue	● Rectified Track Voltage Out	
+5	Red/White Stripe	● 5v Output (Note: 2 outputs)	

When you're finished with your aux lighting connections, you can test the engine again for light functionality. Again, remember that if you're using 1.5v bulbs, you may not initially get the absolute correct behavior you're looking for. Programming the intensity CVs may be required for correct 1.5v light behavior. We recommend making these changes after you have completed your install.

Special Note +12: The "12v" common on the Titan-U is actually rectified track voltage, which means its voltage output will be just slightly less than that of your track. This is helpful when running very high current devices because it removes high current drain from the decoder's on-board power supply.

Step 6: Speaker Mounting

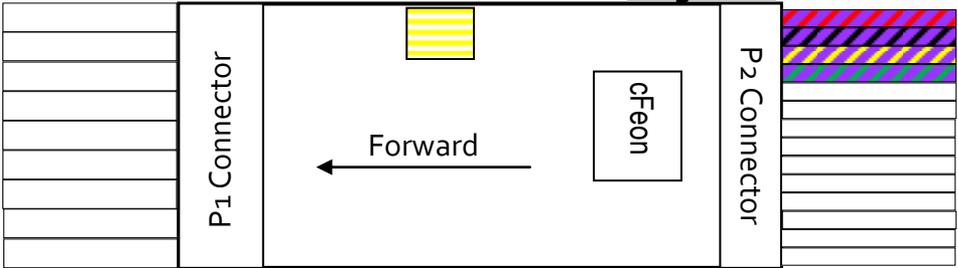
11.

QSI Solutions *strongly* encourages you to utilize speaker enclosures. ALL QSI speakers for HO scale have compatible, snap-fit, enclosure(s) (sold separately). Incorrectly sealed speaker enclosures are the #1 reason behind poor sound output. The section has to be “generalized” because speaker installation is extremely loco-specific. Typically narrow body diesels require use of slimmer oval speakers like the Mini Oval or the Small Oval. When mounting your speakers make sure that you have ample clearance between the speaker cone and any wires which are running through nearby, even minor contact with the surface of the speaker will produce poor sound quality. If you're not sure which speaker best fits your particular locomotive, please contact your Authorized QSI Solutions Dealer, or QSI Solutions directly, for recommendations.

If you are using stereo output it is recommended that you place your speakers as far away from each other as possible for the most dramatic effect.

Step 7: Speaker Connections

Diagram-E



Trim your speaker wires to the appropriate length and strip the ends. Tin the ends of the wires and the solder tabs on the speaker. Connect **PURPLE/YELLOW** wire to the + terminal on your front speaker and the **PURPLE/GREEN** wire to the – terminal on your front speaker. Repeat the process for the rear speaker connecting the **PURPLE/RED** wire to the + terminal of the rear speaker and the **PURPLE/BLACK** wire to the – terminal on the rear speaker.

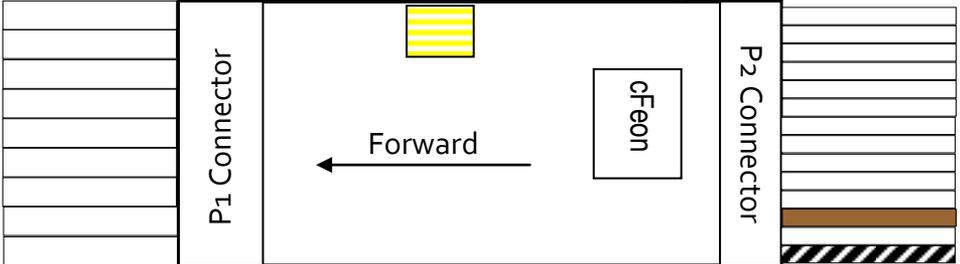
If you are using more than 1 speaker it is very important that the Polarity between the two channels match. Otherwise you'll get an out of phase “spaceship” effect that, while interesting, is not particularly prototypical!

Step 8: Chuff Cam Connection (Steam Only, Optional)

12.

The Titan U steam decoder supports the addition of a cam sensor to make sure you stay at 4 chuffs per wheel revolution. It should be mentioned that chuff cams are double edged sword. When properly setup they are a guaranteed method of making sure your chuff rate stays locked in. However, their setup is time consuming and difficult and they are prone to long term failure due to the contacts getting dirty. We recommend using the BEMF synchronized chuff described in the Steam Programming guides. All this said, if you desire to use a cam you will connect it as follows:

Diagram-F



When using a cam you will connect the wiper to the **TAN** wire shown in Diagram-F. Cams require a second connection as well. In some cases the cam itself is grounded to a live axle at which point there are no additional connections required. If you need to add a second wire to ground your cam you will use the **BLACK/WHITE** wire shown in Diagram-F.

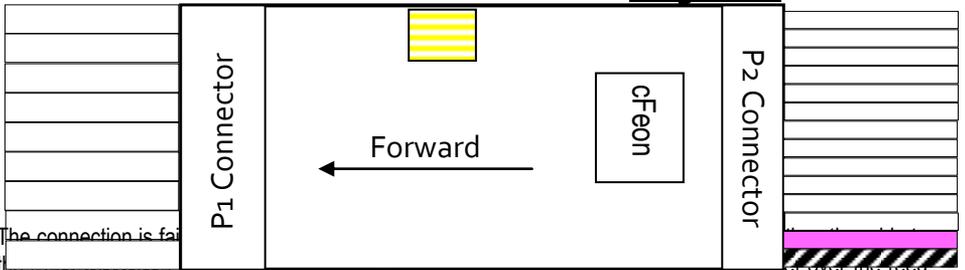
Once your cam is wired you'll need to activate it by setting CV56.0=16. This is done by first setting CV49=0 then CV56=16.

NOTE: Once your cam is activated you may need to tweak the positioning of the wiper itself in order to get proper response from it. They are very sensitive devices and often require a great deal of adjustment for optimum response.

Step 9: Reed Switch Connection (Optional)

The Titan series of decoders can be equipped with a magnetic reed switch for manual volume adjustment or reset operations. This can be extremely handy for DC operators who do not have ready access to programming capabilities when they want to change the master volume of their engine or reset it should it get scrambled. If you wish to use a Reed Switch connect it according to Diagram-G

Diagram-G



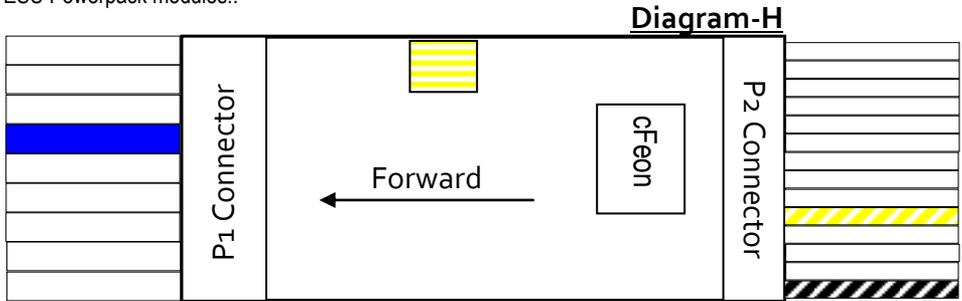
The connection is for the reed switch with the loco running. To reset the decoder; turn the power off, hold the magnet to the reed switch, apply power with the reed switch in place. You will hear the decoder speak the word "RESET" when this is complete.

It should be mentioned that any functions of the reed switch can also be achieved simply by shorting these two wires together.

Step 10: Wiring a "Smart Cap" holdup device (Optional)

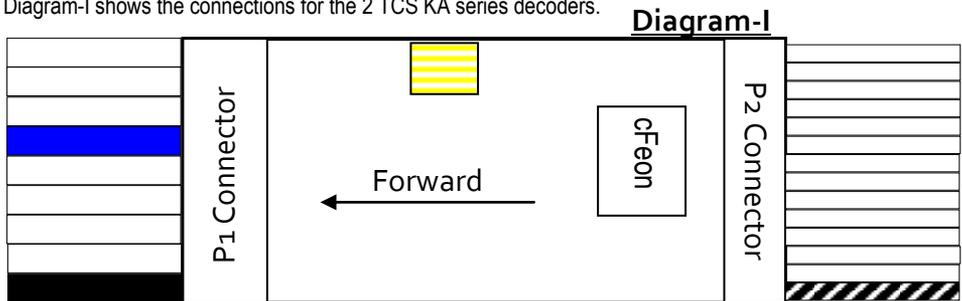
13.

The Titan decoder is compatible with a wide variety of Smart Cap devices which can dramatically improve your operations on a loco with balky pickup. Diagram-H shows the connection points for Lenz Power1 and ESU Powerpack modules..



The Lenz and ESU smart caps use a 3 wire connection. The Blue wire on the smart cap will connect with the **BLUE** wire on the decoder, the Brown wire on the smart cap will connect with the **BLACK/WHITE** wire on the decoder and the Pink wire on the smart cap will connect with the **YELLOW/WHITE** wire on the decoder. All of which are illustrated in Diagram-H.

Diagram-I shows the connections for the 2 TCS KA series decoders.



The TCS KA unit utilizes a simple 2 wire connection. The Blue wire on the KA will be wired to the **BLUE** wire on the decoder and the Black wire on the KA can be wired either to the **BLACK** wire or the **BLACK/WHITE** wire on the decoder, whichever is more convenient for you.

Congratulations! The physical part of the work is done! Now slip your shell back on and drop her on the track. Perform one more quick test run to make sure everything is as it should be, and it's on to programming! The remaining setup information can be found in the companion Titan Q2x or Q3 Programming Guide documents.

DECODER FEATURES:

- Compatible with NMRA DCC Standards & RP's
- Full Compatibility on Analog DC Railroads
- Supports either 2 or 4 digit addresses
- 14,28 or 128 Speed Steps
- Customizable Speed Tables
- High Frequency, Silent Running, Advanced P.I.D. motor drive
- Exclusive Regulated Throttle Control [RTC] for ultra-realistic movement
- Supports advanced consisting and *enhanced* consisting when used with other QSI decoders thanks to RTC, which self-adjusts in consisted trains!
- Supports all "Smart Cap" keep alive technology for non-stop operations on marginal track
- True Stereo Sound Capable
- 16 Bit Audio Processor
- 64 Audio Channels in stereo, 128 in mono
- 30 Different Sound Effects. Each with Volume and Stereo Pan Controls
- Automatic Sounds via "Ready To Move" scenarios
- BEMF driven sound engine, so sound is tied to locomotive action
- "Sound of Power" for simulation of load
- 28 User Assignable Functions
- 10 PWM Lighting outputs each with 256 intensity levels for ultimate customization
- Automatic, directional Rule 17 lighting by default
- Supports Software upgrades via Quantum Programmer (sold separately)

DECODER RATINGS

- Dimensions: Titan-U, 1.81"L x 0.68"Wx0.26"H
- Maximum Peak Voltage: 25v
- Steady State Current: 1.8-2.0 Amps
- Stall Current : 2+ Amps
- Speaker Load: 8 ohms x 2
- Audio Amplifier: Stereo, D Style Format (2 watts)
- Light Outputs: 10 with 256 Intensity levels ea.
- Function Current: 100ma

Have questions? We're happy to help! QSI Solutions prides itself on providing industry-leading customer service. Should you have questions regarding your decoder — or anything pertaining to it — PLEASE don't hesitate to contact us!

Mon-Fri 9am-5pm Eastern Standard Time: 802-448-9899

Email anytime: QuantumRailSounds@Gmail.com

You'll also find many helpful documents on our website: www.QSISolutions.com.

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Manufacturers Guarantee:

This Titan-U decoder is guaranteed to be free of manufacturer defect* for a period of 90 days from date of purchase. Decoder must have been connected via the instructions in this guide and tested within that 90 day period in order to be eligible for free replacement should a problem. You will be asked to provide proof of purchase in order to be eligible for warranty replacement.

*Manufacturer defect refers specifically to the physical assembly of the hardware circuit board. Since this decoder is flash upgradable; software defects/bugs are not grounds for replacement. In the event that you discover a software problem the decoder can either be returned to QSI Solutions for reprogramming, or you can update it yourself using our Quantum Programmer (sold separately).

Accidental Damage Replacement Policy:

Failures caused by faulty installation or lack of adherence to the methods outlined in this guide are not covered under the Manufacturers Guarantee. Each customer will be given 1 complimentary replacement and will be asked to pay a reduced cost replacement fee for each replacement after that. We understand that accidents happen but we cannot be financially liable for more than one installation mistake!

Some restrictions apply for the complete warranty/replacement policy; please see our website.



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